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LOS ANGELES - HOBART RAILYARD TAC EMISSIONS INVENTORY

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This document describes the data and methods used in estimating toxic air contaminant (TAC) emissions resulting from facility operations and other activities in and around the Los Angeles - Hobart facility. The data describe activities grouped by like emission source and by spatial activity. The emission sources include:

- Locomotives
- Cargo Handling equipment
- On-road vehicles
- Off-road equipment
- Stationary sources

Emissions factors for diesel PM and organic gases (which are then speciated into other relevant toxic air contaminants) for each source are included, and emissions estimates provided.

Overview of the Los Angeles - Hobart Yard

The Los Angeles – Hobart yard is a large dedicated intermodal rail yard located at the north end of the Alameda Corridor. The yard gathers and delivers containers and some trailers on rail from trucks and transfers containers and other freight from and onto rail cars with cargo handling equipment. Therefore, the yard itself operates as a classification yard, handling arriving trains and preparing trains for departure. In addition, the mainline rail carries BNSF freight and passenger (AMTRAK and Metrolink) trains with a small amount of foreign freight.

Locomotive Facility Operations

The engine-on locomotive operations at the Hobart – Los Angeles facility do not include service or inspection activities (headings A – C), but do include switching (D) and activities in the classification yard (E) and on the operating tracks (F and G). Under each heading is a description of the operations.

Because different locomotive and engine models have different emissions characteristics, it is important to characterize the types and models of the locomotives that work, arrive and depart, or pass the Hobart - Los Angeles facility. ENVIRON estimated the locomotive fleet fractions for different locomotive types and models using data provided by BNSF. The operation descriptions below each include a uniquely applicable fleet characterization.

A. Basic Locomotive Service

No service or locomotive refueling activity occurs at Hobart - Los Angeles.

B. Basic Engine Inspection

No such activity occurs within the Hobart - Los Angeles facility.

C. Full Engine Service/Inspection

No such activity occurs within the Hobart - Los Angeles facility.

D. Switching Engine Activity

Switching engine fleet characteristics in the Hobart - Los Angeles area were determined by a roster of engines made available by BNSF in early 2006 and reflects the roster for Commerce – Mechanical, Commerce – Eastern, and Hobart yards as each facility shares switching engines. The data are shown in Table 1. Most engines are of similar power and type. This fleet was used to describe the switching engine activity assuming equivalent use of all six engines in the fleet.

Table 1. Locomotive switching engine fleet characterization for service to the Hobart - Los Angeles facility.

Locomotive Model	Certification Tier	HP	Number of Engines	Engine Surrogate
GP-25	Precontrolled	2500	1	GP-3x
GP-30	Precontrolled	2500	3	GP-3x
GP-35	Precontrolled	2500	4	GP-3x
GP39-2	Precontrolled	2300	6	GP-3x
GP39E	Precontrolled	2300	1	GP-3x
SD39	Precontrolled	2300	1	GP-3x
MK1200G	Precontrolled	1200	2	Switcher

The time in mode for switching engine activity in Table 2 was determined from event recorder downloads of a sample of three engines operating in this yard and Commerce – Eastern/Mechanical. The three engines chosen range from 2,300 – 2,500 hp, and are representative of the switching engines dedicated to the area. The time in mode from the event recorder downloads could not distinguish engine idling and engine off periods, so the idle mode was fixed at the EPA switching engine cycle estimate of 59.8% and the remaining notch settings renormalized so that the full cycle sums to 100% of the time. This adjustment has the effect of increasing the emissions estimate by placing more of the activity into the higher notch settings.

Table 2. Switching engine (~2,500 hp) relative time in mode.

Throttle Notch	Time in Mode
DB	0.03%
Idle	59.80%
1	12.66%
2	14.92%
3	7.14%
4	3.86%
5	0.85%
6	0.31%
7	0.18%
8	0.25%

The total switching engine activity consists of 5 locomotive engines operating three shifts per day, 7 days a week. Engines operate on average 5.5 hours per shift. This results in an estimate of 30,112 hours per year for switching activity.

E. Train Arrival and Departures in and from the Yard

Trains arrive and depart from the Hobart - Los Angeles classification yard and have an operating profile distinct from other engines moving through or by the yard. BNSF provided engine counts for arriving and departing trains based on a designation from the yard. However, all trains/engines noted as arriving and departing do not necessarily have business in the yard and may be using the yard tracks as an alternative route to the adjacent mainline. Trains/engines that arrive and depart within one hour were subtracted from the total number of the arrivals and departures. The trains/engines that arrive and depart within one hour are considered to be passing locomotives and appear under activity category (F). A cutoff time of one hour was chosen because the shortest sample locomotive arrival and departure was more than one hour. As noted later in this report, the time for trains passing Hobart – Los Angeles averages over 15 minutes, including idle operation as well as slow speed through the yard, so an upper end estimate of one hour is reasonable. The time on site for arriving and departing trains includes the time when the engine operates (over 3 hours) as well as periods when the engine is shut down waiting for assignment. Therefore, a 1-hour criterion for passing trains was used to select from the arrival and departure database for engines that were truly arriving and departing with the significant periods of idling estimated.

The number of engines listed as arriving and departing from the site was the larger of those labeled train arrival and train departure. A total number of engines that arrive and depart from the yard was recorded as 41,945 with 13,700 long-term (greater than 1 hour) stays that were estimated to be arriving and departing engines. The fleet characteristics by model and emission tier level for arriving and departing trains is shown in Table 3.

Table 3. Fleet characteristics for arriving and departing engines.

Tier	Model	Number	Fleet Fraction
Precntrl	Switchers	7	0%
Precntrl	GP-3x	285	2%
Precntrl	GP-4x	1151	8%
Precntrl	GP-50	43	0%
Precntrl	GP-60	188	1%
Precntrl	SD-7x	3	0%
Precntrl	Dash-7	5	0%
Precntrl	Dash-9	1073	8%
0	GP-60	355	3%
0	SD-7x	9	0%
0	Dash-8	1143	8%
0	Dash-9	5879	43%
1	Dash-9	2666	19%
2	ES44/Dash-9	892	7%

BNSF provided throttle position for a sample engine that arrived and departed out of the Hobart Yard and was considered to be representative of the Hobart - Los Angeles trains' activity. This information is shown in Table 4. The idle mode in the sample could not distinguish between idle with the engine on and idle with the engine off. A separate data set provided information on when the engine was turned on but not when turned off. This dataset indicated that the engine was cranked on twice upon arrival. Therefore, the engine must have been shut off during some periods while in the yard. A more in-depth study for Richmond showed that engines arriving and departing averaged 2.33 hours of idle, so the idle time for the arriving engines was adjusted so that the total arrival and departure idle time would be 2.33 hours.

Table 4. Activity by mode for arriving and departing trains.

Throttle Position	Arriving (Hours)	Departing (Hours)
DB	0.081	0.037
Idle	0.631	1.702
T1	0.223	0.160
T2	0.134	0.033
T3	0.066	0.011
T4	0.008	0.005
T5	0.000	0.000
T6	0.000	0.000
T7	0.000	0.000
T8	0.000	0.000

F. Freight Movements on Adjacent Mainline

The adjacent main line along the (primarily) north-northwest edge of the facility and runs approximately 1.8 miles, and corresponds to milepost 144.6 to 146.4.

Two subcategories of freight movements occur on the mainline: BNSF and non-BNSF (foreign). All operations for both subcategories are assumed to occur throughout a 24-hour period. BNSF reads radio tags for most of the traffic along its mainline, cataloging every locomotive except most of the Metrolink engines operating commuter trains during weekdays at milepost 152, a few miles east of the facility.

BNSF Freight Movements

Data provided by BNSF showed a total of 57,124 locomotives pass an automatic reader east of the Hobart - Los Angeles facility between May 1, 2005 and April 30, 2006. 13,700 of these locomotives were estimated to have both arrived and departed from Hobart - Los Angeles. From this total of 57,124, the number of arriving and departing engines was subtracted for each arrival and departure because that train/engine activity was included under Heading E and would be counted at milepost 152 (east of the yard) when heading westbound (arriving) and eastbound (departing) from the yard. The fleet characteristics for these 29,514 (57,124 – 2 x 13,700) engines are shown in Table 5. Because only the total number of locomotives was available, ENVIRON assumed one-half were traveling Eastbound (from the Alameda Corridor), and one-half were traveling Westbound (into the Alameda Corridor). ENVIRON determined the time in mode distributions for Eastbound and Westbound mainline activity using sample event recorder data from a representative engine. The total time to pass the Los Angeles - Hobart facility amounts to about 15 minutes including idle periods.

Table 5. Fleet characterization for locomotive mainline activity past the Hobart - Los Angeles facility.

Tier	Model	Number	Fleet Fraction
Precntrl	Switchers	33	0%
Precntrl	GP-3x	2469	28%
Precntrl	GP-4x	2605	10%
Precntrl	GP-50	82	0%
Precntrl	GP-60	504	3%
Precntrl	SD-7x	0	0%
Precntrl	Dash-7	36	0%
Precntrl	Dash-9	2257	7%
0	GP-60	1352	11%
0	SD-7x	17	0%
0	Dash-8	2788	13%
0	Dash-9	10756	16%
1	Dash-9	5004	9%
2	ES44/Dash-9	1610	2%

Table 6. Locomotive time in mode passing the Hobart - Los Angeles facility.

Throttle Position	Time in Mode (hrs)
DB	0.000
Idle	0.119
T1	0.018
T2	0.021
T3	0.047
T4	0.050
T5	0.000
T6	0.000
T7	0.000
T8	0.000

Foreign (non-BNSF) Freight Movements

Data provided by BNSF showed only 222 foreign (non-BNSF and non-Commuter) locomotives passing the Commerce-Mechanical facility between May 1, 2005 and April 30, 2006. As with the BNSF freight, ENVIRON assumed one-half (111) were traveling Eastbound, and one-half (111) were traveling Westbound. Without engine model descriptions for these locomotives, ENVIRON made the assumption that the fleet mix and time in mode for these engines would be the same as what Tables 5 and 6 show for the BNSF engines.

G. Commuter Rail Operations on Adjacent Mainline

BNSF data show that AMTRAK operates 10,469 trains per year in both directions throughout the week along this line. BNSF also confirmed that Metrolink operates 7,280 trains per year along this line, with activity occurring only during weekdays. Although it does not occur throughout a 24-hour period, this operation is assumed to occur throughout a 24-hour period for modeling simplicity in this study.

Exact fleet characteristics are not known for the AMTRAK and Metrolink locomotives. However, both ARB and BNSF have indicated the predominance of F59PHI (EMD 710E3, 3000 hp) engines in the AMTRAK and Metrolink fleets, which for purposes of emissions estimates in this study are modeled using the average emission levels from the EPA (1997) study for the two 12 cylinder EMD 710G3 engines based on similarities in engine design, size, and power rating.

Locomotive Emission Factors for Diesel Particulate Matter

Emission factors used in this study were based primarily on the emission factors used in the California Air Resources Board (ARB)'s Risk Assessment Study for the Union Pacific Roseville facility, and the Southwest Research Institute (SwRI, 2000) study sponsored by ARB, entitled "Diesel Fuel Effects on Locomotive Exhaust Emissions." Since the publication date of the

Roseville report, ARB provided ENVIRON with additional emission factors for criteria pollutants, and made some adjustments to the original Roseville data (ARB, 2006a). ENVIRON also received permission from the engine owners to obtain additional emission factor data from the Exhaust Plume Study performed by SwRI (2005). The PM emission factors relevant to all locomotives in the Hobart - Los Angeles facility are summarized in Tables 7a and 7b for several different locomotive model groups and certification tiers. Specific locomotives and engines in each locomotive model group can be inferred from the fleet characterization tables provided above.

Based on conversation with the principal researcher on all the locomotive studies (SwRI, 2006), ENVIRON learned that a default fuel sulfur content of 0.3% was used on all test results and certification data produced with locomotives to date (the emission rates in SwRI, 2000 were those with 0.3% sulfur fuel). The emission rates using this fuel are reflected in Table 7a.

Table 7a. PM emission factors for locomotives used in the study, assuming default fuel sulfur content (0.3%).

Locomotive Model Group	Cert Tier[a]	Emission Factors (g/hr) by Throttle Notch									
		Idle	DB[b]	1	2	3	4	5	6	7	8
Switchers (1)	Precntl	31.0	56.0	23.0	76.0	138.0	159.0	201.0	308.0	345.0	448.0
GP-3x (1)	Precntl	38.0	72.0	31.0	110.0	186.0	212.0	267.0	417.0	463.0	608.0
GP-4x (1)	Precntl	47.9	80.0	35.7	134.3	226.4	258.5	336.0	551.9	638.6	821.3
GP-50 (1)	Precntl	26.0	64.1	51.3	142.5	301.5	311.2	394.0	663.8	725.3	927.8
GP-60 (1)	Precntl	48.6	98.5	48.7	131.7	284.5	299.4	375.3	645.7	743.6	941.6
SD-7x (1)	Precntl	24.0	4.8	41.0	65.7	156.8	243.1	321.1	374.8	475.2	589.2
Dash-7 (1)	Precntl	65.0	180.5	108.2	121.2	359.5	327.7	331.5	299.4	336.7	420.0
Dash-9 (2)	Precntl	32.1	53.9	54.2	108.1	219.9	289.1	370.6	437.7	486.1	705.7
EMD 12-710G3 (3)	Precntl	27.5	54.5	34.0	112.5	208.0	234.5	291.0	423.0	545.0	727.5
GP-60 (4)	0	21.1	25.4	37.6	75.5	239.4	352.2	517.8	724.8	1125.9	1319.8
SD-7x (1)	0	14.8	15.1	36.8	61.1	230.4	379.8	450.8	866.2	1019.1	1105.7
Dash-8 (1)	0	37.0	147.5	86.0	133.1	291.4	293.2	327.7	373.5	469.4	615.2
Dash-9 (5)	0	33.8	50.7	56.1	117.4	229.2	263.8	615.9	573.9	608.0	566.6
Dash-9 (4)	1	16.9	88.4	62.1	140.2	304.0	383.5	423.9	520.2	544.6	778.1
ES44/Dash-9 (4)	2	7.7	42.0	69.3	145.8	304.3	365.0	405.2	418.4	513.5	607.5

(1) Final locomotive emission factors (an update to the Roseville study emission factors Table B-1) received via email from Dan Donohue of ARB, May 9, 2006.
(2) "Diesel Fuel Effects on Locomotive Exhaust Emissions," Southwest Research Institute, October 2000.
(3) EPA, 1997.
(4) Confidential data from SwRI, 2006.
(5) Average of ARB and SwRI, 2006.
[a] Precntl: Precontrolled
[b] DB: Dynamic Braking

Table 7b provides emission factors adjusted for fuel sulfur content of 0.105%. This adjustment was performed according to documented ARB procedures from the OFFROAD Modeling Change Technical Memo (Wong, 2005). All locomotive emissions presented in this document utilized the emission factors from Table 7b.

Table 7b. Emission Factors for locomotives used in the study, adjusted for reduced fuel sulfur content (0.105%).

Locomotive Model Group	Cert Tier[a]	Emission Factors (g/hr) by Throttle Notch									
		Idle	DB[b]	1	2	3	4	5	6	7	8
Switchers (1)	Precntl	31.0	56.0	23.0	76.0	131.8	146.1	181.5	283.2	324.4	420.7
GP-3x (1)	Precntl	38.0	72.0	31.0	110.0	177.7	194.8	241.2	383.4	435.3	570.9
GP-4x (1)	Precntl	47.9	80.0	35.7	134.3	216.2	237.5	303.5	507.4	600.4	771.2
GP-50 (1)	Precntl	26.0	64.1	51.3	142.5	288.0	285.9	355.8	610.4	681.9	871.2
GP-60 (1)	Precntl	48.6	98.5	48.7	131.7	271.7	275.1	338.9	593.7	699.1	884.2
SD-7x (1)	Precntl	24.0	4.8	41.0	65.7	149.8	223.4	290.0	344.6	446.8	553.3
Dash-7 (1)	Precntl	65.0	180.5	108.2	121.2	322.6	302.9	307.7	268.4	275.2	341.2
Dash-9 (2)	Precntl	32.1	53.9	54.2	108.1	197.3	267.3	343.9	392.4	397.3	573.3
EMD 12-710G3 (3)	Precntl	27.5	54.5	34.0	112.5	186.6	216.8	270.1	379.3	445.4	591.0
GP-60 (4)	0	21.1	25.4	37.6	75.5	228.7	323.6	467.7	666.4	1058.5	1239.3
SD-7x (1)	0	14.8	15.1	36.8	61.1	220.1	349.0	407.1	796.5	958.1	1038.3
Dash-8 (1)	0	37.0	147.5	86.0	133.1	261.5	271.0	304.1	334.9	383.6	499.7
Dash-9 (5)	0	33.8	50.7	56.1	117.4	205.7	243.9	571.5	514.6	496.9	460.3
Dash-9 (4)	1	16.9	88.4	62.1	140.2	272.8	354.5	393.4	466.4	445.1	632.1
ES44/Dash-9 (4)	2	7.7	42.0	69.3	145.8	273.0	337.4	376.0	375.1	419.6	493.5

(1) Final locomotive emission factors (an update to the Roseville study emission factors Table B-1) received via email from Dan Donohue of ARB, May 9, 2006.
(2) "Diesel Fuel Effects on Locomotive Exhaust Emissions," Southwest Research Institute, October 2000.
(3) EPA, 1997.
(4) Confidential data from SwRI, 2006.
(5) Average of ARB and SwRI, 2006.
[a] Precntl: Precontrolled
[b] DB: Dynamic Braking

The sulfur content value of 0.105% used for the adjustment was obtained by averaging data provided by BNSF for diesel fuel dispensed and corresponding sulfur level at all California sites and those near California. For sites outside of California, ENVIRON assumed that half of the fuel dispensed would be used in California, because trains moving in either direction may be fueled there. In reality, it is likely that less than half of the out-of-state fuel dispense will be used in California, because many of those sites are a significant distance from the state border. The data and overall estimates are shown in Table 8.

Table 8. Fuel sulfur and total annual fueling at various locomotive fueling locations

Location	State	Total Gallons	% Sulfur
Holbrook	AZ	21,935	0.192
Phoenix	AZ	3,542,292	0.034
Flagstaff	AZ	2,019	0.192
Kingman	AZ	334,309	0.034
Vacaville	CA	33,074	0.034
Redding	CA	1,004	0.192
Summit	CA	1,750	0.192
San Diego	CA	530	0.192
Bakersfield	CA	240,976	0.034
Barstow	CA	1,946,092	0.015

Location	State	Total Gallons	% Sulfur
Oakland	CA	1,762,993	0.034
Needles	CA	770,667	0.192
Bakersfield	CA	131,075	0.034
Bakersfield	CA	11,070	0.034
Corona	CA	103,982	0.034
Fresno	CA	2,669,884	0.034
Kaiser	CA	460,390	0.034
Kings Park	CA	61,900	0.034
Pittsburg	CA	12,695	0.034
Riverbank	CA	2,070,244	0.034
San Bernardino	CA	9,940,295	0.034
San Diego	CA	111,369	0.192
Stockton	CA	1,018,965	0.034
Stuart Mesa	CA	41,509	0.192
Terminal Island	CA	14,816,643	0.192
Victorville	CA	66,042	0.034
Watson	CA	1,152,454	0.192
Bakersfield	CA	11,236	0.192
Winslow	AZ	3,496,072	0.170
Belen	NM	202,462,278	0.192
Barstow	CA	52,439,321	0.015
Commerce	CA	31,573,289	0.015
Richmond	CA	22,255,177	0.034
Klamath Falls	OR	3,070,865	0.381

The fuel sulfur correction methodology described by ARB (2005a) was used to adjust PM emission rates from an average fuel sulfur level of 0.3% to 0.105% using the fuel sulfur – PM relationship equation, A + B * (fuel sulfur, ppm). The emission reductions calculated for GE and EMD engines shown in Table 9 were applied to the base emission rates to calculate the emission rates at the in-use fuel sulfur levels.

Table 9. Fuel sulfur emission reductions by notch and engine type

Notch	B	A	Fuel Sulfur 0.3% EF (g/hp-hr)	Fuel Sulfur 0.105% EF (g/hp-hr)	Reduction
GE 4-stroke Engine					
8	0.00001308	0.0967	0.13594	0.110434	18.76%
7	0.00001102	0.0845	0.11756	0.096071	18.28%
6	0.00000654	0.1037	0.12332	0.110567	10.34%
5	0.00000548	0.132	0.14844	0.137754	7.20%
4	0.00000663	0.1513	0.17119	0.1582615	7.55%
3	0.00000979	0.1565	0.18587	0.1667795	10.27%

Notch	B	A	Fuel Sulfur 0.3% EF (g/hp-hr)	Fuel Sulfur 0.105% EF (g/hp-hr)	Reduction
EMD 2-stroke engine					
8	0.0000123	0.3563	0.3932	0.369215	6.10%
7	0.0000096	0.284	0.3128	0.29408	5.98%
6	0.0000134	0.2843	0.3245	0.29837	8.05%
5	0.000015	0.2572	0.3022	0.27295	9.68%
4	0.0000125	0.2629	0.3004	0.276025	8.11%
3	0.0000065	0.2635	0.283	0.270325	4.48%

Locomotive Diesel PM Emission Estimates

A. Basic Service

No such activity occurs within the Hobart - Los Angeles facility.

B. Basic Engine Inspection

No such activity occurs within the Hobart - Los Angeles facility.

C. Full Engine Service/Inspection

No such activity occurs within the Hobart - Los Angeles facility.

D. Switching Engine Activity

Estimated annual PM emissions for switching activities at the Hobart – Los Angeles facility are presented in Table 10. ENVIRON calculated these emissions using the engine-specific emission factors by notch in Table 7b, the fleet characteristics in Table 1, and the relative time in mode data from Table 2. The switching activity over 365 days per year was distributed equally across all 18 engines in the switching fleet. This category represents the switching engines activity that can occur any where in the yard. The switching engine activity is known only by the engine hours and selected downloads of the time in mode (notch) for the activity in the general area.

Table 10. Estimated annual PM emissions associated with movements of cars within the classification yard of the Hobart - Los Angeles facility.

Locomotive Model Group	Cert Tier	# of Loco	PM Emissions (grams)
Switchers	Precntl	2	**173,714**
GP-3x	Precntl	16	**1,840,058**
Total		**18**	**2,013,772**

E. Train Arrival and Departures in and from the Yard

Engines on trains that arrive and depart from the yard have a different activity profile than the switching engines or those that pass the yard. Emissions were derived based on the activity for an arriving and departing train. The emissions for all engines arriving and departing are shown in Tables 11 and 12.

Table 11. Arriving train's engine emissions for Hobart - Los Angeles.

Model Group	Cert Tier	Emissions by Mode (g/year)						Total
		Idle	DB	1	2	3	4	
Switchers	Precntl	131	30	34	68	58	8	**330**
GP-3x	Precntl	6,841	1,655	1,976	4,221	3,324	463	**18,481**
GP-4x	Precntl	34,811	7,422	9,178	20,786	16,319	2,279	**90,795**
GP-50	Precntl	712	224	496	831	819	103	**3,185**
GP-60	Precntl	5,768	1,492	2,047	3,331	3,352	431	**16,421**
SD-7x	Precntl	47	1	28	27	30	6	**140**
Dash-7	Precntl	196	70	116	78	101	12	**572**
Dash-9	Precntl	21,730	4,657	12,991	15,593	13,876	2,390	**71,238**
GP-60	0	4,724	726	2,980	3,603	5,321	957	**18,311**
SD-7x	0	86	11	76	76	133	27	**410**
Dash-8	0	26,632	13,577	21,955	20,449	19,585	2,580	**104,778**
Dash-9	0	125,482	23,998	73,649	92,765	79,271	11,950	**407,116**
Dash-9	1	28,422	18,986	36,978	50,256	47,677	7,877	**190,196**
ES44/Dash-9	2	4,334	3,019	13,809	17,490	15,971	2,509	**57,131**
Total		259,915	75,870	176,315	229,574	205,837	31,593	**979,104**

Table 12. Departing train's engine emissions for Hobart - Los Angeles.

Model Group	Cert Tier	Emissions by Mode (g/year)						Total
		Idle	DB	1	2	3	4	
Switchers	Precntl	369	14	26	18	10	5	**442**
GP-3x	Precntl	18,435	752	1,414	1,036	534	262	**22,434**
GP-4x	Precntl	93,927	3,378	6,575	5,110	2,627	1,291	**112,907**
GP-50	Precntl	1,904	101	353	203	131	58	**2,749**
GP-60	Precntl	15,553	679	1,465	818	539	244	**19,299**
SD-7x	Precntl	123	1	20	7	5	3	**157**
Dash-7	Precntl	553	33	87	20	17	7	**717**
Dash-9	Precntl	58,650	2,120	9,309	3,835	2,235	1,354	**77,503**
GP-60	0	12,750	331	2,136	886	857	543	**17,502**
SD-7x	0	226	5	53	18	21	15	**338**
Dash-8	0	71,895	6,182	15,735	5,030	3,155	1,463	**103,460**
Dash-9	0	338,609	10,923	52,761	22,807	12,763	6,771	**444,634**
Dash-9	1	76,694	8,641	26,489	12,355	7,676	4,463	**136,320**
ES44/Dash-9	2	11,692	1,374	9,890	4,299	2,571	1,421	**31,247**
Total		701,381	34,534	126,311	56,441	33,141	17,901	**969,709**

F. Freight Movements on Adjacent Mainline

The PM emission estimates for BNSF freight movements during the one-year period are presented in Table 13 and those for other railroad engines in Table 14. The movements include some time in idle (averaging about 7 minutes where trains are delayed presumably due to congestion or other reasons) and some time (about 8 minutes) moving through the yard boundaries. These engines operate primarily in dynamic braking mode as both east and westbound trains are not accelerating through this section.

Table 13. Estimated annual PM emissions associated with BNSF freight movements along the mainline adjacent to the Hobart - Los Angeles facility.

Model Group	Cert Tier	Emissions by Mode (g/year)						Total
		Idle	DB	1	2	3	4	
Switchers	Precntl	61	0	7	26	102	121	**317**
GP-3x	Precntl	5,603	0	702	2,829	10,296	12,091	**31,521**
GP-4x	Precntl	7,458	0	852	3,644	13,222	15,555	**40,732**
GP-50	Precntl	127	0	39	122	554	589	**1,431**
GP-60	Precntl	1,463	0	225	691	3,215	3,486	**9,080**
SD-7x	Precntl	0	0	0	0	0	0	**0**
Dash-7	Precntl	140	0	36	45	273	274	**768**
Dash-9	Precntl	4,328	0	1,122	2,542	10,453	15,165	**33,609**
GP-60	0	1,704	0	466	1,063	7,257	10,999	**21,489**
SD-7x	0	15	0	6	11	88	149	**269**
Dash-8	0	6,153	0	2,199	3,866	17,111	18,995	**48,323**
Dash-9	0	21,735	0	5,530	13,149	51,926	65,952	**158,293**
Dash-9	1	5,051	0	2,849	7,308	32,039	44,599	**91,845**
ES44/Dash-9	2	740	0	1,023	2,445	10,318	13,657	**28,184**
Total		54,579	0	15,054	37,742	156,854	201,633	**465,862**

Table 14. Estimated annual PM emissions associated with non-BNSF freight movements along the mainline adjacent to the Hobart - Los Angeles facility.

Model Group	Cert Tier	Emissions by Mode (g/year)						Total
		Idle	DB	1	2	3	4	
Switchers	Precntl	0	0	0	0	0	0	**0**
GP-3x	Precntl	43	0	5	22	79	93	**243**
GP-4x	Precntl	57	0	7	28	102	119	**313**
GP-50	Precntl	2	0	0	1	7	7	**17**
GP-60	Precntl	12	0	2	5	26	28	**72**
SD-7x	Precntl	0	0	0	0	0	0	**0**
Dash-7	Precntl	0	0	0	0	0	0	**0**
Dash-9	Precntl	33	0	8	19	79	114	**253**
GP-60	0	13	0	3	8	54	81	**159**
SD-7x	0	0	0	0	0	0	0	**0**
Dash-8	0	46	0	17	29	129	143	**364**
Dash-9	0	164	0	42	99	391	497	**1,192**
Dash-9	1	38	0	22	55	243	339	**697**
ES44/Dash-9	2	6	0	8	18	77	102	**210**
Total		413	0	114	286	1,186	1,523	**3,520**

G. Commuter Rail Operations on Adjacent Mainline

The annual PM emission estimates for commuter movements on the adjacent mainline are presented in Table 15. Time in notch for these locomotives was assumed to be the same as was modeled for the freight locomotives. AMTRAK and Metrolink estimates are kept separate, since Metrolink only operates on weekdays.

Table 15. Estimated annual PM missions associated with commuter movements along the mainline adjacent to the Hobart – Los Angeles facility.

Model Group	Locomotive Model Group	Cert Tier	# of Loco	Emissions by Mode (g/year)						Total
				Idle	DB	1	2	3	4	
AMTRAK	EMD 12 710G3	Precntl	10,469	17,194	0	3,263	12,268	45,853	57,057	135,636
Metrolink	EMD 12 710G3	Precntl	7,280	11,956	0	2,269	8,531	31,886	39,677	94,319
Total				29,150	0	5,532	20,800	77,739	96,734	229,955

Non-Locomotive Facility Operations, Emission Factors and Emission Estimates

The operations at the Hobart - Los Angeles facility also include non-locomotive activity within the yard (H through L). Under each heading is a description of the operations.

H. Cargo Handling Equipment Operations

Cargo handling equipment (CHE) is used to handle intermodal freight at the Hobart site and includes yard hostlers, cranes, and container handling equipment. Based on the equipment population and activity where available, ARB provided the emission estimates based on their latest emissions models.

Input data was received for BNSF for California sites CHE characteristics. CHE July 2004 to June 2005 diesel fuel consumption at the Hobart site was also obtained from BNSF (1,280,444 gallons diesel) representative of 2005 CHE diesel fuel consumption. Table 16 shows Hobart site CHE characteristics and activity. Cumulative hours were estimated based on annual use and equipment model year. A set of yard trucks registered for on-road use were also provided along with off-road equipment, but these trucks are used to ferry empty or damaged containers to off-site facilities, so their activity is accounted for under on-road truck trips.

Table 16. Hobart CHE characteristics and activity.

ID	Equipment Type	Number	Model Year	Fuel Type	Engine Rated HP	Annual Use (hrs)[1]
Hobart-1	Cranes	1	1992	D	225	1632
Hobart-2	Cranes	1	2000	D	225	1632
Hobart-3	Cranes	1	2001	D	225	1632
Hobart-4	Cranes	1	2001	D	225	1632
Hobart-5	Cranes	1	1998	D	225	1632
Hobart-6	Cranes	1	1998	D	225	1632

ID	Equipment Type	Number	Model Year	Fuel Type	Engine Rated HP	Annual Use (hrs)[1]
Hobart-7	Cranes	1	1998	D	225	1632
Hobart-8	Cranes	1	1999	D	225	1632
Hobart-9	Cranes	1	2000	D	225	1632
Hobart-10	Cranes	1	2001	D	225	1632
Hobart-11	Cranes	1	2001	D	225	1632
Hobart-12	Cranes	1	2001	D	225	1632
Hobart-13	Cranes	1	2002	D	225	1632
Hobart-14	Cranes	1	2002	D	225	1632
Hobart-15	Cranes	1	2002	D	225	1632
Hobart-16	Cranes	1	2002	D	225	1632
Hobart-17	Cranes	1	2005	D	225	1632
Hobart-18	Cranes	1	2005	D	225	1632
Hobart-19	Container Handling Equipment	1	1989	D	205	2388
Hobart-20	Container Handling Equipment	1	1989	D	205	2388
Hobart-21	Container Handling Equipment	1	1996	D	205	2388
Hobart-22	Container Handling Equipment	1	1994	D	205	2388
Hobart-23	Container Handling Equipment	1	2003	D	205	2388
Hobart-24	Container Handling Equipment	1	1997	D	205	2388
Hobart-25	Container Handling Equipment	1	1999	D	205	2388
Hobart-26	Container Handling Equipment	1	2001	D	205	2388
Hobart-27	Cranes	1	2004	D	369	1632
Hobart-28	Cranes	1	2004	D	369	1632
Hobart-29	Cranes	1	2005	D	369	1632
Hobart-30	Cranes	1	2005	D	369	1632
Hobart-31	Container Handling Equipment	1	1989	D	210	2388
Hobart-32	Container Handling Equipment	1	1989	D	210	2388
Hobart-33	Container Handling Equipment	1	2000	D	210	2388
Hobart-34	Container Handling Equipment	1	2001	D	210	2388
Hobart-35	Yard Trucks	15	2003	D	155	1289
Hobart-36	Yard Trucks	25	2004	D	155	1289
Hobart-37	Yard Trucks	27	2005	D	155	1289
Hobart-38	Yard Trucks	47	2006	D	155	1289

[1]ARB, 2005b Average annual use for diesel fueled intermodal equipment

ARB indicated that the use of fuel consumption as the activity indicator for cargo handling equipment was not consistent with its approach for estimating emissions. Therefore, ARB used the equipment profiles in Table 16 and default activity estimates to determine the Hobart facility CHE emissions shown in Table 17.

Table 17. CHE DPM Emissions Estimates (grams per year).

ID	Equipment Type	Fuel Type	Number	PM (gpy)
Hobart-1	Crane	D	1	68,451
Hobart-2	Crane	D	1	23,817
Hobart-3	Crane	D	1	23,092
Hobart-4	Crane	D	1	23,092
Hobart-5	Crane	D	1	25,266

ID	Equipment Type	Fuel Type	Number	PM (gpy)
Hobart-6	Crane	D	1	25,266
Hobart-7	Crane	D	1	25,266
Hobart-8	Crane	D	1	24,541
Hobart-9	Crane	D	1	23,817
Hobart-10	Crane	D	1	23,092
Hobart-11	Crane	D	1	23,092
Hobart-12	Crane	D	1	23,092
Hobart-13	Crane	D	1	22,367
Hobart-14	Crane	D	1	22,367
Hobart-15	Crane	D	1	22,367
Hobart-16	Crane	D	1	22,367
Hobart-17	Crane	D	1	14,808
Hobart-18	Crane	D	1	14,808
Hobart-19	Material Handling Equip	D	1	134,404
Hobart-20	Material Handling Equip	D	1	134,404
Hobart-21	Material Handling Equip	D	1	48,868
Hobart-22	Material Handling Equip	D	1	119,084
Hobart-23	Material Handling Equip	D	1	31,671
Hobart-24	Material Handling Equip	D	1	47,543
Hobart-25	Material Handling Equip	D	1	44,892
Hobart-26	Material Handling Equip	D	1	42,240
Hobart-27	Crane	D	1	25,157
Hobart-28	Crane	D	1	25,157
Hobart-29	Crane	D	1	24,286
Hobart-30	Crane	D	1	24,286
Hobart-31	Material Handling Equip	D	1	137,682
Hobart-32	Material Handling Equip	D	1	137,682
Hobart-33	Material Handling Equip	D	1	44,629
Hobart-34	Material Handling Equip	D	1	43,271
Hobart-35	Yard Tractor offroad	D	15	352,006
Hobart-36	Yard Tractor offroad	D	25	452,653
Hobart-37	Yard Tractor offroad	D	27	400,945
Hobart-38	Yard Tractor offroad	D	47	679,261
Diesel Equipment Total				3,401,089

I. On-road Container Truck Operations

The Hobart - Los Angeles site is characterized by container service, where tractor-trailers receive or deliver primarily containers to the container yard, and by trailer on rail service, where the entire trailer is delivered or shipped on a rail car.

To address truck traffic, BNSF determined the truck counts at their entrance and exit gates. However, truck counts are conducted in such a manner that only tractor-trailer combination trucks are counted. Therefore summing the total truck entrances and exits will overestimate the total truck trips by the number of trips that trucks both enter and leave as a tractor-trailer combination. So BNSF determined the trucks using identification tags that were counted as both an entrance and exit as tractor-tractor trailer combinations within a period of time. However because many tractors may make several trips to the facility within a day, a time limit for matching entrances and exits was used to limit the entrance and exit matches. Shown in Table 18 are the truck trips using 30 minutes, 1 hour, 1.5 hour, and 2 hours as the period for determining truck matches where the truck trips estimated decreases as the matching period increases. The time on the site is at a minimum of 30 minutes at Los Angeles - Hobart as described below, so return trips by trucks cannot reasonably have been within 1 hour. So 1 hour was used as the period of matching though some trucks may spend more than an hour on site and therefore be counted at both the entrance and exit.

Table 18. Los Angeles - Hobart truck counts by time period for 4 months.

Truck Trip Description	Matching Period			
	0.5 hr	**1 hr**	**1.5 hr**	**2 hr**
Total Trucks Logging In & Out Gates (Trailer-Truck In, Trailer-Truck Out) (Matches)	29,450	**58,984**	66,293	69,313
Trucks Logging In Without Logging Out (Trailer-Truck In, Bobtail Out)	221,601	**192,067**	184,758	181,738
Trucks Logging Out Without Logging In (Bobtail In, Trailer-Truck Out)	208,307	**178,773**	171,464	168,444
Total Truck Trips	459,358	**429,824**	422,515	419,495
Scaled to 12 months		**1,289,472**		

In addition, BNSF on-site contractors operate a fleet of on-road trucks to move empty containers to off-site lots and other facilities. These vehicles make approximately 1300 trips a day from the contractor gate separate from the other entrance and exit for other container trucks. The contractor trucks result in another 474,500 trips per year.

A sample chase truck study was conducted to determine entrance queuing time, average speed and distance on site, time on site (engine on or off noted), and exit queuing time. The results for 38 trucks chased were used to estimate the typical operation characteristics for the Los Angeles - Hobart site. The average results for the fleet are shown in Table 19. However because the chase truck study was conducted from the entrance gate to the exit gate, it ignored travel within the site boundary but outside the gates. Most of the estimated added travel distance was at the entrance (about 2000 ft.) with less (about 600 ft.) after the exit gate for a total of 0.5 miles added as shown in Table 19.

Table 19. Average activity for truck trips using chase truck surveys.

Mode	Time (min)	Speed (mph)	Distance (miles)	Outside Gates – Inside Site Boundary Distance (miles)
Entrance Queue (Inside or Outside of Site Boundary)	8.4	--	--	--
Travel on site	5.2	16.5	1.4	0.5
Idle on Site	19.1	--	--	--
Exit Queue	1.1	--	--	--

BNSF determined the emissions for these trucks using the Ports (POLA, 2005) truck age distribution. Since this site largely serves containers from Ports, the average age distribution at the Ports' gates was used. The HHDDV emission rates were calculated for each aged engine by interpolating between 15 and 20 mph to determine the emission rates at an average speed of 16.53 mph. These estimates are shown in Table 20 with summary emissions estimates in Table 21. Another fleet of BNSF contractor vehicles is dedicated to the off-site removal of empty or damaged containers from Hobart, and this fleet of vehicles has a known age distribution with only 3 model years represented.

Table 20. Emission rate calculations for Hobart.

		Basic Trucks			Contractor Fleet		
Truck Age Distribution	Idle PM EF (g/hr)	15 mph PM EF (g/mile)	16.53 mph PM EF (g/mile)	20 mph PM EF (g/mile)	Truck Age Dist.	Idle PM EF (g/hr)	16.53 mph PM EF (g/mile)
0.27%	1.03	0.42	0.39	0.33	32%	1.03	0.39
0.36%	1.03	0.47	0.44	0.36	11%	1.03	0.44
0.73%	1.03	0.52	0.48	0.40	56%	1.03	0.48
0.94%	1.33	1.37	1.20	0.80			
1.06%	1.33	1.50	1.31	0.87			
2.62%	1.33	1.62	1.41	0.94			
5.33%	1.33	1.73	1.51	1.01			
7.18%	1.33	1.84	1.60	1.07			
9.45%	1.93	1.97	1.71	1.14			
9.27%	1.93	2.06	1.80	1.20			
6.49%	1.93	2.15	1.88	1.25			
6.91%	1.93	2.24	1.95	1.30			
7.23%	2.57	3.21	2.80	1.87			
8.52%	2.57	3.30	2.88	1.92			
5.91%	2.57	3.38	2.95	1.97			
4.37%	3.43	4.66	4.35	3.63			
3.59%	3.43	4.74	4.42	3.70			
6.19%	3.43	4.82	4.49	3.76			
5.47%	4.28	4.94	4.60	3.85			
1.84%	6.88	5.16	4.81	4.02			
1.26%	6.88	5.23	4.87	4.08			
1.02%	6.88	5.29	4.93	4.13			
1.02%	6.88	5.35	4.99	4.17			
0.84%	6.88	5.40	5.04	4.21			
0.49%	6.88	5.45	5.08	4.25			
0.36%	6.88	5.50	5.13	4.29			
0.18%	6.88	5.54	5.16	4.32			
0.25%	6.88	5.57	5.20	4.35			
0.27%	6.88	5.60	5.23	4.37			
0.17%	6.88	5.63	5.25	4.39			
0.13%	6.88	5.65	5.27	4.41			
0.11%	6.88	5.67	5.29	4.42			
0.10%	6.88	5.69	5.31	4.44			
0.00%	6.88	5.70	5.32	4.45			

Truck Age Distribution	Idle PM EF (g/hr)	Basic Trucks 15 mph PM EF (g/mile)	16.53 mph PM EF (g/mile)	20 mph PM EF (g/mile)	Contractor Fleet Truck Age Dist.	Idle PM EF (g/hr)	16.53 mph PM EF (g/mile)
0.00%	6.88	5.71	5.33	4.46			
0.00%	6.88	5.72	5.34	4.46			
0.03%	6.88	5.73	5.35	4.47			
0.00%	6.88	5.75	5.36	4.48			
0.00%	6.88	5.76	5.37	4.49			
0.00%	6.88	5.77	5.38	4.50			
0.06%	6.88	5.78	5.39	4.51			
Average	**2.70 g/hr**	**3.06 g/mile**	**2.75 g/mile**	**2.05 g/mile**	**Average**	**1.03 g/hr**	**0.45 g/mile**

Table 21. Emissions estimates per truck trip for Hobart.

Mode or Location	Basic Container Trucks		Contractor Empty Container Trucks	
	Per trip emissions (PM10 g/trip)	Total Emissions (1,289,472 trips) (PM10 g/yr)	Per trip emissions (PM10 g/trip)	Total Emissions (474,500 trips) (PM10 g/yr)
On-site travel	5.30	6,838,965	0.86	408,255
Idle – on-site	0.85	1,095,918	0.33	154,683
Idle - entrance	0.38	486,766	0.14	68,704
Idle – exit	0.05	69,538	0.02	9,815
Sum (g/yr)		**8,491,187**		**641,457**

J. On-road Fleet Vehicle Operations

There are two types of fleet vehicles; those owned by BNSF and those owned by BNSF's contractor Parsec. The vehicles are parked at different locations on the site and therefore have different travel distances.

There are 28 BNSF-owned fleet vehicles based at the Hobart - Los Angeles facility according to records from BNSF. The EMFAC model provides an average trip distance by vehicle type for the South Coast in 2005. The trip distance was used to determine the number of trips for each vehicle by dividing it into the annual mileage accumulation. The annual mileage was determined from the odometer reading divided by the age of the vehicle, which likely overestimates the annual mileage because vehicles tend to be used less as they age. BNSF fleet vehicles (primarily housed on 26th St.) and distance along 26th to get into or out of the lot would be about 2000 ft, so that was used as the distance traveled within the site for each trip. Table 22 provides the overall activity estimates for this fleet.

Table 22. BNSF On-road fleet vehicle activity at the Hobart - Los Angeles facility.

EMFAC Vehicle Type	Fuel	# of Vehicles	Estimated Average Annual Mileage per Vehicle	Estimated Average Annual Mileage on Site per Vehicle
LDA	Gasoline	4	15,101	1,257
LDT1	Gasoline	1	20,094	1,482
LDT2	Gasoline	13	20,739	1,511
LHDT1	Gasoline	9	19,901	6,005
MDV	Gasoline	1	26,220	1,866

For the contractor vehicles, a similar approach was used except that no annual mileage accumulation figures were available for this fleet. Typical fleet mileage accumulation from the BNSF vehicles or from EMFAC2005 defaults were used where appropriate. The BNSF contractor fleet vehicles were assumed to enter at the intersection of Indiana & Sheila and proceed to the lots near the yard tower or about 3000 ft on site. This is conservatively high because there appears to be a lot near that entrance. Table 23 provides the overall activity estimates for this fleet.

Table 23. Contractor On-road fleet vehicle activity at the Hobart - Los Angeles facility.

EMFAC Vehicle Type	Fuel	# of Vehicles	Estimated Average Annual Mileage per Vehicle	Estimated Average Annual Mileage on Site per Vehicle
LDT2	Gasoline	82	20,739	2,267
LHDT1	Diesel	21	20,852	2,609
HHDT	Diesel	1	59,113	1,049

Annual PM and TOG emission factors from EMFAC and on-site emissions estimates for the fleet vehicles are presented in Table 24. Note that gasoline and diesel vehicle estimates were kept separate, so that gasoline TOG exhaust and evaporative emissions could be speciated into TACs differently. ARB Speciate Profile #2105 will be used for the gasoline TOG exhaust emissions, and Profile #422 will be used for the gasoline TOG evaporative emissions.

Table 24. BNSF and Contractor on-road fleet vehicle emissions at Hobart – Los Angeles.

EMFAC Vehicle Type	Fuel	PM Emissions (grams)	TOG Exhaust Emissions (grams)	TOG Evaporative Emissions (grams)
LDA/LDT1/LDT2/LHDT1/MDV	Gasoline	5,403	180,761	119,308
LHDT1/HHDT	Diesel	3,506	N/A	0

K. Other Off-Road Equipment

K1. Transport Refrigeration Unit Operations

Transportation Refrigeration units (TRUs) are used to regulate temperatures during the transport of products with temperature requirements. In BNSF operations, temperatures are regulated by TRUs in shipping containers and in railcars when the material being shipped require such temperature regulation.

TRU emissions were estimated in accordance with the methodology presented by an early version of the OFFROAD model provided by ARB (2006c). TRU yearly activity was estimated using the time onsite by TRU configuration (either railcar or shipping container) and mode of transport was provided by BNSF. This activity data was used along with ARB default age, horsepower, and load factor input estimates in the OFFROAD model to estimate TRU emissions. All TRUs are assumed to use diesel fuel.

K1a. Boxcars

Hobart site boxcar TRU activity is shown in Table 25. As TRUs are not expected to be operating when a boxcar is not loaded, the TRU activity presented here represents loaded TRU shipping containers only. Hobart container TRU emissions are presented in Table 26.

Table 25. Hobart site Boxcar TRU yearly activity.

Transport Mode	Yearly Visits	Average Time Onsite / Visit (hours)
Train Arrival – Train Departure	14	1

Table 26. Hobart site Boxcar TRU emissions (grams per year).

Mode	TOG	PM
Train Arrival – Train Departure	975	198

K1b. Containers

Hobart site container TRU activity and associated emissions are shown in Table 27. As TRUs are not expected to be operating when a shipping container is not loaded, the TRU activity presented here represents loaded TRU shipping containers only.

Table 27. Hobart site shipping container TRU yearly activity and emissions (grams per year).

Yearly Visits	Total Time Onsite (hours)	Average Time Onsite / Visit (hours)	TOG (gpy)	PM (gpy)
17,604	228,852	13	15,937,586	3,242,640

K2. Track Maintenance Equipment Operations

Track maintenance equipment includes equipment used to service tracks anywhere in California though it may be housed at any given facility. This equipment category includes large and small engines and equipment.

Activity

BNSF California track maintenance equipment can be used on any or all tracks within California to maintain the network. Therefore, the approach used to determine the activity and emissions for a given facility was to estimate emissions from all track maintenance equipment and apportion those emissions by site using the relative track mileage (including all tracks, main line and other tracks) at the site to the California total track mileage.

The Hobart site has 28 miles of track within its boundaries compared with the California regional total of 3,779 miles. This represents 0.7% of the total California track mileage that is maintained.

Appendix I shows a list of all BNSF track maintenance equipment located in California with horsepower and operational parameters. Based on BNSF staff knowledge of equipment characteristics, it was assumed that all track maintenance equipment was diesel powered except two forklifts (equipment IDs TM1 and TM2) which were assumed to be powered by 4-stroke gasoline engines. Forklifts TM1 and TM2 could not be assumed to be diesel powered because diesel forklifts of 16 to 25 horsepower diesel forklifts were not included in the ARB OFFROAD model.

If rated horsepower was not available, horsepower was assumed to be ARB default (ARB, 2006c) for the most populous horsepower range for the assigned ARB equipment category and type. Load factors were assumed to be ARB OFFROAD model default (ARB, 2006c).

Emissions

Exhaust emissions from track maintenance equipment were estimated using the draft version of the OFFROAD model (ARB, 2006c). Emissions from track maintenance equipment at the Hobart facility along with California totals are shown in Table 24.

Table 28. Track maintenance equipment emissions estimates (grams per year).

	Gasoline			Diesel	
Site	Evaporative TOG	Exhaust TOG	PM	TOG	PM
Hobart	159	904	26	91,168	33,376
California Totals	21,469	121,981	3,525	12,305,162	4,504,844

K3. Other Off-road Equipment (including Portable Engine) Operations

There are three other pieces of off-road equipment at the Hobart site including two welders and an air compressor. In this category we also place the three LPG-powered forklifts from the intermodal equipment list because they are not covered by the ARB Cargo Handling Equipment operations emissions estimates.

Activity

Table 29 shows Hobart site portable engine characteristics and activity. As equipment model year was not available, it was assumed to be equivalent to 2005 minus useful life.

Table 29. Portable engine equipment characteristics and operation.

Equipment Type	Number	Model Year	Fuel Type	Rated HP	Activity (hrs/yr)[1]
Welder	2	1996	G	20	208
Air Compressor	1	1989	G	35	484
Forklift	1	1980	LPG	70	1800
Forklift	1	1977	LPG	70	1800
Forklift	1	1985	LPG	70	1800

[1] ARB, 2006c.

Emissions

Emissions from portable engine offroad equipment at the Hobart facility are shown in Table 26 using default activity and other input data from the draft OFFROAD model (ARB, 2006c).

Table 30. Portable engine equipment emissions estimates (grams per year).

Equipment Type	Fuel Type	Evaporative TOG (gpy)	Exhaust TOG (gpy)	PM (gpy)
Welder	Gasoline	8,516	74,392	593
Air Compressor	Gasoline	9,897	68,803	569
Forklift	LPG	0	211,662	2,268
Forklift	LPG	0	211,662	2,268
Forklift	LPG	0	211,662	2,268
Total	**Gasoline**	**18,413**	**143,195**	**1,162**
Total	**LPG**	**0**	**634,986**	**6,804**

L. Stationary Sources

Air quality permits for the Los Angeles - Hobart facility show several types of stationary sources for potential evaluation.

Source types:
(1) Gasoline storage and dispensing unit [1 on site]
(2) Diesel-fueled internal combustion engines (ICEs) [3 on site]

The TOG emissions for the gasoline storage and dispensing unit will be calculated at a later date upon receipt of permit application data from the SCAQMD. Also, the actual activity for each stationary source component will be reviewed prior to inclusion into the dispersion modeling analysis and so may change such as use of actual hours rather than maximum hours as presented here.

The relevant parameters for the three diesel ICEs, as well as their estimated annual PM and TOG emissions are presented in Table 31. To estimate emissions from the three diesel ICEs at the Richmond site, ENVIRON utilized the ARB OFFROAD model provided by ARB (2006c).

Table 31. Parameters and PM emissions estimates for the diesel-fueled ICEs at the Richmond facility.

Specifications	Brake horsepower (hp)	Maximum Est. Operation Time (hr/yr)	PM Emissions (grams)
Generac SD 300 w/ filter	440	199	16,455
Generac SD 250 w/ filter	440	199	16,455
Generac SD 600	870	199	32,535
Total			**65,444**

Total TAC emissions from the Hobart - Los Angeles facility

The estimated total annual diesel PM (DPM) emissions associated with the operations in the Hobart - Los Angeles facility are summarized in Table 26.

Table 31. Estimated total annual DPM emissions associated with the operations in the Hobart - Los Angeles facility.

Facility Operations	PM Emissions		Percentage
	Grams	Metric Tons	
Basic Services (A)	0	0	0%
Basic Engine Inspection (B)	0	0	0%
Full Engine Service/Inspection (C)	0	0	0%
Switching (D)	2,013,772	2.01	10%
Arriving and Departing Trains (E)	1,948,813	1.95	9%
Adjacent Freight Movements (F)	469,382	0.47	2%
Adjacent Commuter Rail Operations (G)	229,955	0.23	1%
Cargo Handling Equipment Operations (H)	3,401,089	3.40	17%
On-Road Container Truck Operations (I)	8,491,187	8.49	41%
On-Road Container Truck Operations (I) Contractors	641,457	0.64	3%
On-Road Fleet Vehicle (J)	3,506	0.00	0%

Facility Operations	PM Emissions		Percentage
	Grams	Metric Tons	
Other Off-Road (K) TRU	3,242,838	3.24	16%
Other Off-Road (K) Track Maintenance	33,376	0.03	0%
Other Off-Road (K) Portable Engines	0	0.00	0%
Stationary Sources (L)	65,444	0.07	0%
Total	**20,540,819**	**20.54**	

The estimated total annual emissions of total organic gases (TOG) (for speciation into the other TACs) associated with gasoline, LPG, and CNG operations in the Hobart – Los Angeles facility are summarized in Table 32. The three LPG-fueled forklifts account for a large majority of the emissions. Diesel TOG is not included in the tabulation.

Table 32. Estimated total annual TOG emissions from gasoline/LPG/NG fueled engines associated with the operations in the Hobart – Los Angeles facility.

Facility Operations	TOG Emissions		Percentage
	Grams	Metric Tons	
Basic Services (A)	0	0	0%
Basic Engine Inspection (B)	0	0	0%
Full Engine Service/Inspection (C)	0	0	0%
Switching (D)	0	0	0%
Arriving and Departing Trains (E)	0	0	0%
Adjacent Freight Movements (F)	0	0	0%
Adjacent Commuter Rail Operations (G)	0	0	0%
Cargo Handling Equipment Operations (H)	0	0	0%
On-Road Container Truck Operations (I)	0	0	0%
On-Road Fleet Vehicle (J) Exhaust	180,761	0.18	16%
On-Road Fleet Vehicle (J) Evaporative	119,308	0.12	11%
Other Off-Road (K) TRU	0	0.00	0%
Other Off-Road (K) Track Maintenance Exhaust	904	0.00	0%
Other Off-Road (K) Track Maintenance Evaporative	159	0.00	0%
Other Off-Road (K) Other Portable Engines Exhaust	778,181	0.78	71%
Other Off-Road (K) Other Portable Engines Evaporative	18,413		
Stationary Sources (L)	0	0.00	0%
Total	**1,097,726**	**1.10**	

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APPENDIX I

TRACK MAINTENANCE EQUIPMENT

Equipment ID	Equipment Type	ARB Category	ARB Equipment type	Engine Model Year	Engine Horsepower	Dual Engine (Y/N)	Operating Hours Per week	Average Operating Hours Per Year
TM1	FORKLIFT	Industrial	Forklifts	1998	17	N	30	1440
TM2	FORKLIFT	Industrial	Forklifts	1985	17	N	30	1440
TM3	ANCHOR APPLICATOR	Industrial	Other General Industrial	1988	50	N	25	1200
TM4	ANCH REMVR	Industrial	Other General Industrial	1994	90	N	15	720
TM5	ANCHOR BOXER	Industrial	Other General Industrial	1987	76	N	25	1200
TM6	ANCHOR BOXER	Industrial	Other General Industrial	1987	76	N	25	1200
TM7	ANCHOR REMOVER	Industrial	Other General Industrial	1995	50	N	20	960
TM8	ANCHOR APP/REM	Industrial	Other General Industrial	2004	50	N	25	1200
TM9	ANCHOR APP/REM	Industrial	Other General Industrial	2004	50	N	25	1200
TM10	ANCHOR APP/REM	Industrial	Other General Industrial	2004	50	N	25	1200
TM11	AIR COMPRESSOR	Commercial	Air Compressors	1989	35	N	12	576
TM12	AIR COMPRESSOR	Commercial	Air Compressors	1989[a]	35	N	15	720
TM13	AIR COMPRESSOR	Commercial	Air Compressors	1989[a]	35	N	10	480
TM14	AIR COMPRESSOR	Commercial	Air Compressors	1989[a]	35	N	10	480
TM15	ADZ/CRIB-DCF	Industrial	Other General Industrial	2002	90	N	15	720
TM16	DBL BRM	Industrial	Other General Industrial	1983	100	N	0	0
TM17	DBL BRM	Industrial	Other General Industrial	1985	100	N	0	0
TM18	DBL BRM TRLR	Industrial	Other General Industrial	2000	100	N	25	1200
TM19	BALLAST REGULATOR	Industrial	Other General Industrial	1981	64	N	17.29	829.92
TM20	BALLAST REGULATOR	Industrial	Other General Industrial	1991	64	N	0	0
TM21	BALLAST REGULATOR	Industrial	Other General Industrial	1986	64	N	0	0
TM22	BALLAST REGULATOR	Industrial	Other General Industrial	1979	64	N	45	2160
TM23	BALLAST REGULATOR	Industrial	Other General Industrial	1984	175	N	45	2160
TM24	BALLAST REGULATOR	Industrial	Other General Industrial	1983	175	N	0	0
TM25	BALLAST REGULATOR	Industrial	Other General Industrial	1985	175	N	0	0
TM26	BALLAST REGULATOR	Industrial	Other General Industrial	1996	175	N	10.2	489.6
TM27	BALLAST REGULATOR	Industrial	Other General Industrial	1996	175	N	31.33	1503.84
TM28	BALLAST REGULATOR	Industrial	Other General Industrial	1996	175	N	0	0
TM29	BALLAST REGULATOR	Industrial	Other General Industrial	2003	175	N	15	720
TM30	LOCOMOTIVE CRANE	Construction	Cranes	1979	250	N	0	0
TM31	TRUCK CRANE	Construction	Cranes	1986	175	Y	0	0
TM32	RUBBER TIRED CRANE	Construction	Cranes	1982	175	N	0	0

Equipment ID	Equipment Type	ARB Category	ARB Equipment type	Engine Model Year	Engine Horsepower	Dual Engine (Y/N)	Operating Hours Per week	Average Operating Hours Per Year
TM33	RUBBER TIRED CRANE	Construction	Cranes	1999	175	N	0	0
TM34	RUBBER TIRED CRANE	Construction	Cranes	2001	175	N	0	0
TM35	WHL LDR	Construction	Rubber Tired Loaders	1974	300	N	3.06	146.88
TM36	CRN/LDR HR	Construction	Cranes	1974	100	N	0	0
TM37	CRN/LDR HR	Construction	Cranes	1984	100	N	0	0
TM38	CRN/LDR HR	Construction	Cranes	1984	100	N	3.36	161.28
TM39	CRN/LDR HR	Construction	Cranes	1984	100	N	28.8	1382.4
TM40	WHL LDR*GP	Construction	Rubber Tired Loaders	1995	120	N	0	0
TM41	SKID-LDR FBHTAH	Construction	Skid Steer Loaders	2003	74	N	0	0
TM42	CRN/LDR HR	Construction	Cranes	2004	100	N	26.56	1274.88
TM43	BK-HO/LDR	Construction	Tractors/Loaders/Backhoes	1992	75.5	N	2	96
TM44	BK-HO/LDR	Construction	Tractors/Loaders/Backhoes	1992	75.5	N	0	0
TM45	BK-HO/LDR EH	Construction	Tractors/Loaders/Backhoes	1995	69	N	12.37	593.76
TM46	BK-HO/LDR EH	Construction	Tractors/Loaders/Backhoes	1995	69	N	46.38	2226.24
TM47	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	1998	78	N	0	0
TM48	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	1999	78	N	0	0
TM49	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	1999	78	N	12.88	618.24
TM50	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	1999	78	N	7.31	350.88
TM51	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	1999	78	N	8.91	427.68
TM52	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	2000	78	N	0	0
TM53	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	2003	88	N	0	0
TM54	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	2004	88	N	1.65	79.2
TM55	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	2004	88	N	9.93	476.64
TM56	BK-HO/LDR EF	Construction	Tractors/Loaders/Backhoes	2004	88	N	6.13	294.24
TM57	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	119	N	15	720
TM58	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	85	N	15	720
TM59	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM60	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM61	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM62	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM63	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720

Equipment ID	Equipment Type	ARB Category	ARB Equipment type	Engine Model Year	Engine Horsepower	Dual Engine (Y/N)	Operating Hours Per week	Average Operating Hours Per Year
TM64	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM65	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM66	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	85	N	15	720
TM67	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	99	N	15	720
TM68	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM69	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	74	N	15	720
TM70	BK-HO/LFR EF	Construction	Tractors/Loaders/Backhoes	1989[a]	85	N	15	720
TM71	DirectionaL Boring Machine	Construction	Bore/Drill Rigs	2002[a]	82[b]	N	15	720
TM72	Manlift	Industrial	Aerial Lifts	1989[a]	34[b]	N	15	720
TM73	Trencher	Construction	Trenchers	1998[a]	39	N	15	720
TM74	Trencher	Construction	Trenchers	1998[a]	39	N	15	720
TM75	Trencher	Construction	Trenchers	1998[a]	39	N	15	720
TM76	Trencher Rider	Construction	Trenchers	1998[a]	79	N	15	720
TM77	RAIL LIFTER	Industrial	Other General Industrial	1997	19	N	20	960
TM78	TIE SPIKER	Industrial	Other General Industrial	1986	19	N	0	0
TM79	TIE SPIKER	Industrial	Other General Industrial	1986	19	N	0	0
TM80	TIE SPIKER	Industrial	Other General Industrial	1991	19	N	3.1	148.8
TM81	TIE SPIKER	Industrial	Other General Industrial	2002	90	N	10	480
TM82	TIE SPIKER	Industrial	Other General Industrial	2002	90	N	10	480
TM83	TIE SPIKER	Industrial	Other General Industrial	2002	90	N	10	480
TM84	SPIKE PULLER	Industrial	Other General Industrial	1984	35	N	10	480
TM85	SPIKE PULLER	Industrial	Other General Industrial	1995	35	N	10	480
TM86	SPIKE PULLER	Industrial	Other General Industrial	1995	35	N	10	480
TM87	SPIKE PULLER	Industrial	Other General Industrial	1986	35	N	0	0
TM88	DITCHER/SPREADER	Industrial	Other General Industrial	1980	97[b]	N	15	720
TM89	TIE TAMPER	Industrial	Other General Industrial	1985	175	N	20	960
TM90	TIE TAMPER	Industrial	Other General Industrial	1985	175	N	3.74	179.52
TM91	TIE TAMPER	Industrial	Other General Industrial	1989	250	N	22.4	1075.2
TM92	TIE TAMPER	Industrial	Other General Industrial	1995	250	N	40	1920
TM93	TIE TAMPER	Industrial	Other General Industrial	1996	250	N	40	1920
TM94	TIE TAMPER	Industrial	Other General Industrial	1996	250	N	90	4320
TM95	TIE TAMPER	Industrial	Other General Industrial	1996	250	N	40	1920

Equipment ID	Equipment Type	ARB Category	ARB Equipment type	Engine Model Year	Engine Horsepower	Dual Engine (Y/N)	Operating Hours Per week	Average Operating Hours Per Year
TM96	TIE TAMPER	Industrial	Other General Industrial	1997	250	N	0.92	44.16
TM97	TIE TAMPER	Industrial	Other General Industrial	2000	250	N	35	1680
TM98	TIE TAMPER	Industrial	Other General Industrial	2000	300	N	40	1920
TM99	TIE TAMPER	Industrial	Other General Industrial	2001	250	N	31	1488
TM100	TIE TAMPER	Industrial	Other General Industrial	2002	300	N	35	1680
TM101	TIE TAMPER	Industrial	Other General Industrial	2003	250	N	0	0
TM102	TIE TAMPER	Industrial	Other General Industrial	1995	175	N	0	0
TM103	TIE TAMPER	Industrial	Other General Industrial	1987	175	N	0	0
TM104	TIE TAMPER	Industrial	Other General Industrial	1985	150	N	15	720
TM105	TIE CRANE	Construction	Cranes	1982	64	N	15	720
TM106	TIE CRANE	Construction	Cranes	1982	64	N	0	0
TM107	TIE CRANE	Construction	Cranes	1985	64	N	0	0
TM108	TIE CRANE	Construction	Cranes	1986	64	N	0	0
TM109	TIE PLUGGER	Industrial	Other General Industrial	2000	90	N	20	960
TM110	TIE PLUGGER	Industrial	Other General Industrial	2002	90	N	20	960
TM111	TIE PLUGGER	Industrial	Other General Industrial	2003	90	N	20	960
TM112	TIE INSERT/EXTRACT	Industrial	Other General Industrial	1985	175	N	0	0
TM113	TIE INSERT/EXTRACT	Industrial	Other General Industrial	1985	175	N	0	0
TM114	TIE INSERT/EXTRACT	Industrial	Other General Industrial	1987	175	N	41.58	1995.84
TM115	DOZER	Construction	Crawler Tractors	1985	145	N	0	0
TM116	WELDER	Commercial	Welders	1984	64	N	25	1200
TM117	WELDER	Commercial	Welders	1984	64	N	25	1200
TM118	WELDER	Commercial	Welders	1986	64	N	25	1200
TM119	WELDER	Commercial	Welders	1987	64	N	25	1200
TM120	WELDER	Commercial	Welders	1988	40	N	25	1200
TM121	WELDER	Commercial	Welders	1988	64	N	25	1200
TM122	WELDER	Commercial	Welders	1988	64	N	25	1200
TM123	WELDER	Commercial	Welders	1998	64	N	25	1200
TM124	WELDER	Commercial	Welders	1999	64	N	25	1200
TM125	WELDER	Commercial	Welders	1999	64	N	25	1200
TM126	WELDER	Commercial	Welders	1999	64	N	25	1200
TM127	WELDER	Commercial	Welders	2000	64	N	25	1200
TM128	WELDER	Commercial	Welders	2000	64	N	25	1200

Equipment ID	Equipment Type	ARB Category	ARB Equipment type	Engine Model Year	Engine Horsepower	Dual Engine (Y/N)	Operating Hours Per week	Average Operating Hours Per Year
TM129	WELDER	Commercial	Welders	2000	40	N	25	1200
TM130	WELDER	Commercial	Welders	2000	40	N	25	1200
TM131	WELDER	Commercial	Welders	2001	64	N	25	1200
TM132	WELDER	Commercial	Welders	2003	40	N	25	1200
TM133	WELDER	Commercial	Welders	2003	64	N	25	1200
TM134	WELDER	Commercial	Welders	2003	40	N	25	1200
TM135	WELDER	Commercial	Welders	2004	64	N	25	1200
TM136	WELDER	Commercial	Welders	2004	64	N	25	1200
TM137	WELDER	Commercial	Welders	2004	64	N	25	1200
TM138	WELDER	Commercial	Welders	2004	40	N	25	1200
TM139	WELDER	Commercial	Welders	2005	40	N	25	1200
TM140	WELDER	Commercial	Welders	2005	40	N	25	1200
TM141	WELDER	Commercial	Welders	2005	40	N	25	1200
TM142	WELDER	Commercial	Welders	2005	40	N	25	1200
TM143	RAIL HEATER	Industrial	Other General Industrial	1982	90	N	25	1200
TM144	RAIL HEATER	Industrial	Other General Industrial	1995	90	N	25	1200
TM145	SPIKE RECLAIMER	Industrial	Other General Industrial	1992	90	N	25	1200
TM146	TIE PLATE RETRIEVER	Industrial	Other General Industrial	2003	25	N	25	1200
TM147	TRACK STABILIZER	Industrial	Other General Industrial	1989	300	N	9.26	444.48
TM148	TRACK STABILIZER	Industrial	Other General Industrial	2000	300	N	45	2160
TM149	TRACK STABILIZER	Industrial	Other General Industrial	2001	300	N	45	2160

[a] Model year estimated as 2005 minus ARB default useful life.
[b] Horsepower estimated as ARB default for the most populous horsepower range for the associated equipment type.